

HBS 4055, Economics 2035
Fall 2014

Matthew Rabin
HBS and Economics Department
Harvard University

Psychology and Economic Theory

Tomorrow's Assumptions, Today

Mondays 1:00-4:00, 209 Aldrich Hall
Concrete actual times: 1.15 to 3.55

Your Host: Matthew Rabin
Office: 435 Baker Library, M8 Littauer Center, e-mail: matthewrabin@fas.harvard.edu

Teaching Fellow: Neil Thakral
Office: Littauer basement

WHAT IS THIS COURSE, AND CAN/SHOULD YOU TAKE IT?

This course explores ways that psychological research indicating systematic departures from classical economic assumptions can be translated into formal models that can be incorporated into economics. Topics include ways utility theory can be improved—such as incorporating reference dependence, news utility, social preferences, self image, and other belief-based tastes—and ways we can relax assumptions of perfect rationality—such as incorporating focusing effects, limited attention, biased prediction of future tastes, present-biased preferences, biases in probabilistic judgment, and errors in social inference. The course will emphasize (a) careful interpretation and production of new evidence on relevant departures, (b) formalizing this evidence into models that can, with discipline and rigor, generate sharp predictions using traditional economic approaches, and (c) exploring economic implications of those models presented. Although we will primarily emphasize (b), the course is meant to be useful to students whose interests lie anywhere in this spectrum, under the premise that all such research will be improved by a greater appreciation of the full spectrum. The course is intended for PhD students in the Business Economics and Economics programs and others who have a solid background in microeconomic theory at the level of introductory PhD courses in these programs. (Microeconomic courses in other programs on campus, and even many non-Harvard Economics PhD courses, are generally *not* likely to be adequate substitutes.) While obviously appropriate to those wishing to specialize in “behavioral economics”, the course is also designed for those interested in doing research in particular fields of economics. And while the course centers on theoretical models (learning and evaluation will center around solving formal problem sets), the theory is focused on empirical implementability and economic relevance, so that the course is also designed for those interested in theory-influenced empirical research.

This course contains material and approaches targeted at those with an interest in doing PhD-level research in economics. **Enrollment for credit in this course is simply not suitable for those unprepared or uninterested in PhD-level economics no matter the intensity of interest in psychology or behavioral economics. *Really.***

The course focuses on formal modeling. The course will involve more words and more intuition and more classical middlebrow economic theory than the typical advanced-theory field course. It will, of course, involve more reading and discussion of the behavioral evidence and psychological foundations of our assumptions than do other theory (or non-theory) economics courses. But, in the end, its emphasis is on formal modeling.

Economics 2035 can be combined with Economics 2030 (which will be offered Spring 2015) to write the Psychology and Economics field exam.

The topics covered in this course are listed later in the syllabus. Generally I will assign readings covering some of the evidence suggesting that new assumptions would improve economic analysis, discuss this evidence very briefly in class, and then use this evidence to develop new formal models. When available, I will assign papers that contain the formal models. To keep the workload manageable (sort of), the number of assigned readings will be minimal, and too little to give a full sense of the relevant evidence; students are encouraged to read further.

If—after you have read the syllabus, and preferably after attending the first lecture—you have any questions about whether this course is appropriate for you, please come talk to me.

Admission for credit will be automatic for regular (non-visiting) Harvard students in any department who have passed Economics 2010a and 2010b with a grade of B+ or better. (Those who have taken 2020a and 2020b may also qualify, but should perhaps talk to me.) Undergraduates with *advanced* training in microeconomic theory and who have an interest in Economics graduate studies are also encouraged to consider taking the course. Visiting students and students enrolled at other universities (besides MIT) cannot take the course for credit, for either grades or pass-fail, or as an official auditor whose attendance or participation I must certify to somebody.

Anybody is permitted to attend the lectures and I am delighted if people can benefit.

DETAILED COURSE NON-DESCRIPTION

Because it is designed as an introduction to modeling psychological phenomena that are not yet totally integrated into mainstream economic analysis, the material in this course is not entirely like what you've seen in most of your other economics courses. But it is *not* an alternative to mainstream economics. It is only about improving the psychological realism of formal economics, so as to use classical economic approaches to improve our answers to classical economic questions. Like all other courses, this course does not cover all topics that might be of interest. So, this course is ...

not about the philosophy or methodology of economics

Maybe too little time is spent on methodology in graduate school. And some methodological quandaries inhere in the topics of this course. But beyond a brief discussion at the beginning, we will not spend time exploring methodological issues. Doing so takes time away from the substance. And usually when economists debate “Methodology” in the context of challenging existing assumptions, the debate ends up focusing on an abstract official line about appropriate methodology, rather than a realistic assessment of how workaday economic research is actually done. The maintained hypothesis of the course is that it is sensible for some economists to spend some of their time doing standard economic research that happens to incorporate some untraditional-within-economics elements of human nature that seem to be both true and economically relevant.

not about non-psychological models of bounded rationality

We won’t consider models of bounded rationality (based on computer science, artificial intelligence, etc.) that are meant to capture cognitive limits of economic actors, but not based on evidence that humans think this way. In some arenas I think it makes tremendous sense to focus on these alternative models of bounded rationality, and more generally this can be a very useful research agenda. But that’s not what this course is about. We will consider those models based on research inspired by the empirical evidence of what humans are like.

not about savanna economics

Many people are interested in how the human species evolved to be the way we are, and most economists are most prone to think evolutionary arguments when being exposed to unfamiliar assumptions. Whatever the merits or demerits of an evolutionary perspective on social science, it is not what this course is about. Under the maintained hypothesis that in the (very long) “short run” we can treat the biological aspects of human nature as fixed, we won’t consider the biological dynamics of evolutionary change. We will try to figure out some facts about what humans are like, and see how that matters for the economy. Any empirical insights into how people are—from whatever source, including by researchers who find a focus on evolutionary pressures to be enlightening—is of course welcome. And presumably some researchers believe that the focus on evolutionary pressures will eventually yield high payoff in understanding humans as they currently are, at which point evolution-inspired insights into human nature about economically relevant behavior can be incorporated into a course like this. But this course will not emphasize why being the way we are was adaptive for our ancestors on the savanna.

not about experimental economics as such

Readings will include experimental papers, and as such we will when appropriate examine the nature of the experimental evidence. But the course won’t be about experimental methods per se. I am not qualified to give detailed guidance, and in any event this course is meant to use the results from experiments to motivate new economic assumptions, and to emphasize the potential for non-experimental research in these topics. We also won’t study experiments testing economic institutions in the laboratory, except insofar as they are either motivated by or informative about the underlying psychology of economic actors.

totally not an alternative to mainstream economics.

In the most important senses, the course won't at all be a departure from mainstream economics. I am a devotee of mainstream economic methods: methodological individualism; formal, careful, mathematical articulation of assumptions; logical analysis of what conclusions follow from those assumptions; and thoughtful empirical testing of both the assumptions and the conclusions. This isn't the only way to approach social science, and it is true that obsessions with methodological individualism and mathematics can sometimes damage research. It is a good thing that these methods and standards are not imposed on all social-science research. Indeed, much of the evidence for the formal models we will be developing doesn't meet economists' narrow criteria for good research—and it should humble us that so much useful insight is derived from modes of research we do not employ. But it is my belief that the best way for economists to do economics in general, and the best way for us to use this material in particular, is with careful formal theory and statistical analysis. In these regards, the course will be purposely, pointedly, persistently, proudly, and ponderously mainstream.

COURSE REQUIREMENTS

There will be three problem sets. Problems will range in difficulty from moderately easy to quite hard. These problems aren't meant to be simple, and don't panic if you struggle with them. But the problem sets will be graded for correctness, so please do seek help answering any problems you are struggling with *before* handing them in.

You are encouraged to work together on the problem sets, but you are *not* allowed to read others' answers from past or present problem sets, and should hand in solutions separately that reflect your own understanding. You should acknowledge collaborators and describe the extent of collaboration at the top of the relevant assignments. While collaboration is allowed, directly copying someone else's work is not, and will be considered a violation of the university's code of ethics.

Problem sets are due by 1.15 pm the day they are due. (The first two are due in lecture; we will announce where the final one is due.) Late problem sets will not be accepted. Please staple your problem set together (paper clips and folded corners are not staples.)

There are limits to the amount of time we can spend grading the problem sets. Answers requiring too much ocular, linguistic, or (avoidable) cognitive effort won't be read. Please make an effort to write/type legibly and present your results clearly and succinctly. Problems will frequently require substantial math; you are welcome to hand in all the work you did to reach an answer, but *please* make sure to provide guidance through your steps of reasoning, or to flag work that is superfluous to the reader. Cross out anything not meant to be part of your answer. Clearly indicate your answer by labeling (if typed) or circling (if handwritten).

Planned (but possibly altered) schedule of problem sets:

Problem Set Larry: Distributed September 8 & 22, due October 6, returned October 20.

Problem Set Moe: Distributed October 6 & 20, due November 10, returned November 24.

Problem Set Curly: Distributed November 10 and December 1, due December 15.

In class exam: November 17. Few reasons will be accepted for rescheduling the exam, and no non-emergency reasons will be accepted after September 22.

The course grade will be determined 40% by the exam, 20% each by Larry, Moe, and Curly, possibly with some mean-and-standard-deviation adjustments.

HANDOUTS, LECTURE NOTES, OFFICE HOURS, AND WHAT NOT

I intend to post both lecture notes and handouts (including problem sets, but not answer keys) on <https://canvas.harvard.edu/courses/1230>

In class and elsewhere, please address me by my first name. Don't call me Professor Rabin. (If you insist on addressing me formally, please address me as "The Legendary Patsy Cline.")

Although Neil will obviously be a major resource, please use my office hours, including for help on the problem sets. It would be remarkable if you didn't need some assistance with the material, and I am here to help. One of the benefits of open office hours is to accommodate many students at once; if fellow 2035 students are in my office, please join in (I'll say so if for some reason I need to talk privately to a current visitor), and feel very free to show up in groups.

In addition to drop-in office hours, I always have sign-up office hours for advising and other purposes. They are online, linked from my web page. Please **do not** sign up for these slots for course-related help as a general rule. If my scheduled office hours are always infeasible for you, let me know, and then I may encourage you to make appointments with me. But I ask that you schedule your studying so that you are prepared to ask questions during office hours, and do not attempt to schedule extra sessions merely because of poor timing in preparation.

Subject to announced changes, I plan to have open office hours this term at the following times (these will also be posted on my web page and on my office door):

Matthew's and Neil's Drop-In Office Hours

Monday, September 8, 4.15 to 5.15 (435 Baker Library), Matthew
Tuesday, September 9, 1.15 to 3.00 (Littauer basement), Neil
Thursday, September 11, 2.00 to 3.00 (M8 Littauer), Matthew
Monday, September 15, 4.15 to 5.15 (435 Baker Library), Matthew
Tuesday, September 16, 12.15 to 1.30 (M8 Littauer), Matthew
Wednesday, September 16, 4.00 to 6.00 (Littauer basement), Neil
Thursday, September 18, 9.45 to 11.15 (Littauer basement), Neil
Monday, September 22, 4.15 to 5.15 (435 Baker Library), Matthew
Tuesday, September 23, 12.15 to 1.30 (M8 Littauer), Matthew
Wednesday, September 24, 4.00 to 5.00 (Littauer basement), Neil
Thursday, September 25, 9.45 to 11.15 (Littauer basement), Neil
Monday, September 29, 4.15 to 5.15 (435 Baker Library), Matthew
Tuesday, September 30, 1.00 to 2.30 (Littauer basement), Neil
Thursday, October 2, 1.45 to 3.15 (M8 Littauer), Matthew
Thursday, October 2, 5.30 to 7.00 (Littauer basement), Neil
Tuesday, October 7, 12.15 to 1.30 (M8 Littauer), Matthew
Thursday, October 9, 2.00 to 3.30 (Littauer basement), Neil
Tuesday, October 14, 1.00 to 2.30 (M8 Littauer), Matthew
Wednesday, October 15, 4.00 to 5.00 (Littauer basement), Neil
Thursday, October 16, 9.45 to 11.15 (Littauer basement), Neil
Monday, October 20, 4.15 to 5.45 (435 Baker Library), Matthew
Thursday, October 23, 2.00 to 3.30 (Littauer basement), Neil
Tuesday, October 28, 12.30 to 2.00 (M8 Littauer), Matthew
Thursday, October 30, 2.00 to 4.00 (Littauer basement), Neil
Monday, November 3, 4.15 to 5.15 (435 Baker Library), Matthew
Thursday, November 6, 1.15 to 3.00 (Littauer basement), Neil
Friday, November 7, 8.00 to 10.00 (Littauer basement), Neil
Wednesday, November 12, 1.30 to 3.00 (M8 Littauer), Matthew
Thursday, November 13, 9.45 to 11.15 (Littauer basement), Neil
Friday, November 14, 8.00 to 10.00 (Littauer basement), Neil
Tuesday, November 18, 12.15 to 1.30 (M8 Littauer), Matthew
Thursday, November 20, 9.45 to 11.15 (Littauer basement), Neil
Monday, November 24, 4.15 to 5.15 (435 Baker Library), Matthew
Tuesday, November 25, 9.45 to 11.15 (Littauer basement), Neil
Monday, December 1, 4.15 to 5.15 (435 Baker Library), Matthew
Tuesday, December 2, 1.00 to 3.00 (Littauer basement), Neil
Wednesday, December 3, 2.00 to 3.30 (M8 Littauer), Matthew
Wednesday, December 10, 4.00 to 6.00 (Littauer basement), Neil
Thursday, December 11, 2.00 to 4.00 (Littauer basement), Neil
Friday, December 12, 8.00 to 10.00 (Littauer basement), Neil

Please pay attention to specific dates and times of our office hours. The rather irregular-seeming schedule is designed with an effort to minimize likely conflicts for students, to be compatible with my other obligations, and to be a good match with the schedule of the course. For your part, please pay advanced attention to this schedule, and plan work so that you can get any desired help from us on problem sets.

The course is also meant to generate research ideas. If you wish to talk about research, drop-in office hours are often fine for this, but please also feel free to sign up to do so. More generally, if for some reason you need to talk to me about something for which open office hours aren't appropriate, you should feel free to sign up. Also, for those in the Business Economics and Economics Ph.D. programs, I and other faculty are always available to discuss *any* issues regarding the program.

Some gentle requests regarding office hours and on contacting me. First, my office hours end sharply at the end. So don't arrive 10 minutes before the scheduled end and expect a full session. Please arrive early if you have lengthy questions, or if you don't want to risk not having time due to others' questions. You are free to ask Neil and me *some* stuff by e-mail, (e.g. a typo or something on a problem set or handout), but please know e-mail sucks for answering many types of questions. "How do I do Question 4?" or "What's up with bounded rationality?" are short questions with long answers.

Please do come to my office hours. I also like students to come by at least once early in the semester to introduce themselves—no need to have a particular agenda. I try to always have candy (and occasionally healthier snacks). I have toys as well, but you must earn my trust before I let you play with them.

RESEARCH

You should now be beginning the shift away from learning the results of other peoples' research into conducting your own research. A major reason for teaching this material is to positively influence your research. Yet: This course won't focus on research. So: I encourage you to think about research on your own, with each other, and with faculty, including me. It is easy to shortchange this goal under the pressure of taking courses and other duties you have, so it requires some focus on your part to attend to it. I encourage you to talk to me about ideas for research applying the material from this (or any) course. While I welcome discussions on any of your ideas, including experimental research and modeling-new-psychology theory, I most strongly encourage ideas for "field-empirical" research and implications-of-these-assumptions theory. I am especially keen on ideas that do not merely test the validity of some of the principles and models discussed in the course, but are of direct general interest to economics. I enjoy talking to students about their ideas for empirical research.

If you are in the second year of the Economics PhD program, you should be attending at least one or two seminars regularly. This is central for you to start your transformation into a research-focused life. I encourage you to attend the "Behavioral" seminar, Tuesdays 2.30 – 4.00 in Littauer M-16 and the theory/behavioral lunch, Wednesdays 11.30 – 1.00 in M15 Littauer. But you should also attend at least one other seminar in some specific area of economics.

Tentative Schedule of Lectures

We meet between September 8 and December 1; with no lectures on October 13 (Columbus Day) or November 17 (in class exam), so there will be 11 3-hour lectures in total. The following schedule is tentative (and the actual schedule will typically lag this; the schedule represents the earliest a topic will be covered).

Lecture 1: September 8

Perspectives and conceptual framework
Introduction to belief-based preferences
Anticipatory utility and ego utility

Readings 1-27

Lecture 2: September 15

Belief-based preferences and personal equilibrium
Introduction to Reference dependence and Prospect Theory

Readings 28-34

Lecture 3: September 22

Reference-dependent risk attitudes
Reference-dependence: expectations as the reference point

Readings 35-43

Lecture 4: September 29

Reference dependence and news utility
Introduction to social preferences

Readings 44-51

Lecture 5: October 6

Distributional social preferences
Reciprocal preferences, self-image, social image
Introduction to Limited Rationality

Readings 52-59

Non-Lecture 1: October 13

NO LECTURE – COLUMBUS DAY

Lecture 6: October 20

Focusing and Bracketing Effects
Introduction to Mispredicting Preferences

Readings 60-73

Lecture 7: October 27

Misprediction of future utility: principles and evidence
Misprediction of future utility: modeling and applications
Introduction to present bias

Readings 74-81

Lecture 8: November 3

Principles of present-biased preferences and procrastination

Readings 82-119

Lecture 9: November 10

Introduction to biases in judgment and quasi-Bayesian models
Sampling biases

Readings 120-134

Non-Lecture 2: November 17

IN-CLASS EXAM

Lecture 10: November 24

Problems and challenges in non-Bayesian models
Introduction to social inference and non-inference

Readings 135-144

Lecture 11: December 1

Models of social learning

Readings 145-156

Readings

The required text is Kahneman, Daniel and Tversky, Amos (editors), *Choices, Values, and Frames*, Cambridge University Press, New York, NY, US, 2000. (Referred to as CVF below.) It should be stocked at the Harvard Coop (and may be popular enough to be available elsewhere). The book is a collection of “recent classics” in psychological economics, and a few specially commissioned new writings. *Many* of the required readings in the course are from this book, serving by far as the main source for the psychological foundations (as opposed to formal modeling) topics in the course—both because I have made some effort to choose those chapters for your ease, and (more) because it happens to contain many of the awesomest writings in psychology & economics. I urge you to buy it and read it even if you are just auditing.

Below is a list of the anticipated reading, in approximate order they will be covered. Any revisions will be announced in class. Even auditors should do as many of the required readings from CVF as possible. (And I highly recommend virtually every chapter in the book, including chapters that I am not assigning.) Despite its length, this list is woefully incomplete.

The readings in bold are required.

1. **Rabin, M. Syllabus.**
2. Kahneman, Daniel, Paul Slovic, and Amos Tversky, eds. (1982): *Judgment under Uncertainty: Heuristics and Biases*, Cambridge University Press. Arguably the seminal book on behavioral economics. [Contains many excellent papers (including virtually all of Kahneman and Tversky’s seminal articles on heuristics and biases).]
3. Kahneman, Daniel and Amos Tversky, eds. (2000): *Choices, Values and Frames*, New York: Russell Sage Foundation: Cambridge University Press.
4. Nisbett R. and S. Ross. (1999) *The Person and Situation*, McGraw Hill.
5. Thaler, Richard H. (1994): *The Winner’s Curse: Paradoxes and Anomalies of Economic Life*, Princeton University Press. Collection of Thaler’s *Anomalies* columns from *Journal of Economic Perspectives*. [See also his more *Anomalies* columns in the *JEP*.]
6. Baron, Jonathan. (1994): *Thinking and Deciding*, Cambridge, UK; New York: Cambridge University Press. [A very nice, but basic (non-economists’) introduction to how people think and decide.]
7. Nisbett, R. and S. Ross. (1980): *Human inference: strategies and shortcomings of social judgment*, Prentice-Hall. [Probably the best textbook introducing the heuristics-and-biases program in social judgment, although that assessment may be dated.]
8. Cialdini, R. (1993): *Influence, the psychology of persuasion*, Quill. A classic in psychology. [Somebody stole my copy of it.]
9. Gilbert, D., S. Fiske, and G. Lindzey, editors. (1998): *Handbook of Social Psychology*, 4th ed., McGraw Hill. [Excellent overview of the state of the art in social psychology.]
10. Thaler, Richard. (1991): *Quasi-Rational Economics*: Russell Sage Foundation.
11. Kahneman, T. Gilovich, & D. Griffin, eds. (2002): *Intuitive Judgment: Heuristics and Biases*, Cambridge: Cambridge University Press. [An update of Kahneman, Slovic, and Tversky 1982.]
12. Thaler, Richard, eds. (1993): *Advances in Behavioral Finance*, New York: Russell Sage Foundation. [Excellent collection of behavioral-finance papers.]
13. Kagel, John. and Alvin Roth, eds. (1995): *Handbook of Experimental Economics*, Princeton, N.J.: Princeton University Press. [Good overview of findings from experimental economics, in

several long chapters.]

14. Camerer, Colin. (2003): *Behavioral Game Theory: Experiments in Strategic Interaction*, Russell Sage Foundation and Princeton University Press. [This very recent book is the Bible of laboratory studies of how people play games, from the man who invented and leads the field. Both brilliant and encyclopedic.]
15. Kahneman, D., Diener, E., and Schwarz, N. (1999): *Well-Being: The Foundations of Hedonic Psychology*, Russell Sage Foundation. [A collection of articles of variable topic and quality, but containing some important chapters. I think it is a revolutionary text.]
16. Camerer, Colin, Loewenstein, George, and Rabin, Matthew, eds. (2003): *Advances in Behavioral Economics*, Russell Sage Foundation and Princeton University Press. [A collection of mostly reprinted articles, with an emphasis on more recent research.]
17. **Thaler, Richard, "Towards A Positive Theory of Consumer Choice," CVF Chapter 15.**
18. **Rabin, Matthew. (1998): "Psychology and Economics." *Journal of Economic Literature* 36 (1): 11-46.**
19. Rabin, Matthew. (2000): "A Perspective on Psychology and Economics," *European Economic Review*, 46(4-5): 657-685.
20. **Rabin, Matthew. (2013): "An Approach to Incorporating Psychology into Economics." *American Economic Review Papers and Proceedings*, 103(3): 617-622.**
21. **Rabin, Matthew. (2013): "Incorporating Limited Rationality into Economics," *Journal of Economic Literature*, 51(2): 528-543.**
22. Rabin, non-existent manuscript, "Is It Better to Explain 8,000% of What's Wrong with Existing Models or 8%?"
23. Card, David, Stefano DellaVigna, and Ulrike Malmendier. (2011): "The Role of Theory in Field Experiments," *Journal of Economic Perspectives*, 25(3): 39-62.
24. Gabaix, Xavier, and David Laibson. (2008): "The Seven Properties of Good Models." In eds Andrew Caplin and Andrew Schotter *The Methodologies of Modern Economics: Foundations of Positive and Normative Economics*, Oxford University Press.
25. Fudenberg, D. (2006): "Advancing Beyond *Advances in Behavioral Economics*," *Journal of Economic Literature*.
26. Kahneman, D. (2011): *Thinking, Fast and Slow*, New York: Farrar, Straus, and Giroux.
27. **DellaVigna, Stefano. (2009): "Psychology and Economics: Evidence from the Field." *Journal of Economic Literature*, 47 (2): 315-372.**
28. **Koszegi, B. (2006): "Emotional Agency," *Quarterly Journal of Economics*, 121(1): 121-155.**
29. Koszegi, B. (2010) "Utility from Anticipation and Personal Equilibrium," *Economic Theory*, 44(3), 415-444.
30. Koszegi, B. (2006), "Ego Utility, Overconfidence, and Task Choice," *Journal of the European Economic Association*, 4(4), pp. 673-707.
31. Kahneman, D., Knetsch, J. and R. Thaler, "Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias" CVF Chapter 8
32. **Tversky, A. and Kahneman, D. "Prospect Theory: An Analysis of Decision under Risk," CVF Chapter 2.**
33. Rabin, Matthew. (2000): "Risk Aversion and Expected-Utility Theory: A Calibration Theorem," *Econometrica*, 68(5), 1281-1292.
34. **Rabin, M. "Diminishing Marginal Utility of Wealth Cannot Explain Risk Aversion," CVF Chapter 11.**
35. Bell, D. E. (1985). Disappointment in decision making under uncertainty. *Operations Research*, 33, 1-27.
36. Gul, F. (1991). A theory of disappointment aversion. *Econometrica*, 59, 667-686.
37. Harless, D., & Camerer, C. F. (1994). The predictive utility of generalized expected utility

- theories. *Econometrica*, 62, 1251–1289.
38. **Koszegi, B. and M. Rabin. (2006): “A Model of Reference-Dependent Preferences,”** *Quarterly Journal of Economics*, 121(4), 1133-1166.
 39. **Koszegi, B. and M. Rabin. (2007): “Reference-Dependent Risk Preferences,”** *American Economic Review*, 97(4), 1047-1073.
 40. Barberis, N., M. Huang, and T. Santos (2001): “Prospect Theory and Asset Prices,” *Quarterly Journal of Economics*.
 41. Odean, T. (1998): “Are Investors Reluctant to Realize Their Losses?” *Journal of Finance*.
 42. List, J. (2003): “Does Market Experience Eliminate Market Anomalies?” *Quarterly Journal of Economics*.
 43. **Kőszegi, Botond and Matthew Rabin. (2009): “Reference-Dependent Consumption Plans,”** *American Economic Review*, 99(3): 909-936.
 44. Pagel, Michaela, “Expectations-Based Reference-Dependent Life-Cycle Consumption”
 45. Pagel, M., “A News-Utility Theory for Inattention and Rebalancing in Portfolio Choice”
 46. Pagel, M., “Expectations-Based Reference-Dependent Preferences and Asset Pricing”
 47. **Kahneman, D., Knetsch, J. and R. Thaler, “Fairness as a Constraint on Profit Seeking: Entitlements in the Market,”** CVF Chapter 18
 48. Rabin, Matthew. (1993): “Incorporating Fairness Into Game Theory and Economics,” *American Economic Review*, 83: 1281-1302.
 49. Fehr, Ernst, and Klaus Schmidt. (1999): “A Theory of Fairness, Competition, and Cooperation.” *Quarterly Journal of Economics*, 114 (3): 817-868.
 50. Bolton, Gary E., and Axel Ockenfels. (2000): “ERC: A Theory of Equity, Reciprocity, and Competition.” *American Economic Review*, 90 (1): 166-193.
 51. **Charness, G. and Rabin, M. (2002): “Understanding Social Preferences with Simple Tests,”** *Quarterly Journal of Economics*, 117 (3): 817-869.
 52. **Dana, J., R. Weber, and J. Kuang. (2007): “Exploiting moral wriggle room: experiments demonstrating an illusory preference for fairness.”** *Economic Theory*, 33, 67–80.
 53. Levine, D. (1998): “Modeling Altruism and Spitefulness in Experiments,” *Review of Economic Dynamics*.
 54. **Kahneman, Danny and Amos Tversky, “Rational Choice and the Framing of Decisions,”** CVF Chapter 12.
 55. **Thaler, R. “Mental Accounting Matters,”** CVF Chapter 14
 56. **Benartzi, S. and R. Thaler, “Myopic Loss Aversion and the Equity Premium Puzzle,”** CVF Chapter 17.
 57. Benartzi, Shlomo and Richard H. Thaler. (2001): “Naive Diversification Strategies in Retirement Saving Plans,” *American Economic Review*, 91(1): 79-98.
 58. Choi, James J., David Laibson, Brigitte C. Madrian. (2009): “Mental Accounting in Portfolio Choice: Evidence from a Flypaper Effect.” *American Economic Review* 99(5): 2085-2095.
 59. **Camerer, C., L. Babcock, G. Loewenstein, and R. Thaler, “Labor Supply of New York City Cab Drivers: One Day at a Time,”** CVF Chapter 20.
 60. **Read, D., G. Loewenstein, and M. Rabin, “Choice Bracketing,”** *Journal of Risk and Uncertainty*, 19 (1-3): 171-197.
 61. **Rabin, Matthew and Georg Weizsäcker. (2009): “Narrow Bracketing and Dominated Choices,”** *American Economic Review*, 99 (4): 1508-1543.
 62. Barberis, Nicholas, and Ming Huang. (2009): “Preferences with frames: A new utility specification that allows for the framing of risks.” *Journal of Economic Dynamics and Control*, 33: 1555-1576.
 63. Barberis, N., M. Huang, and R. Thaler (2006). “Individual Preferences, Monetary Gambles, and Stock Market Participation: A Case for Narrow Framing,” *American Economic Review*.

64. Hastings, J. and J. Shapiro (2012): Premium Gasoline, JPE.
65. Tversky, A., and I. Simonson (1993). "Context-Dependent Preferences," *Management Science*.
66. Mellers, Barbara and A. Cooke (1994), "Tradeoffs depend on attribute range", *Journal of Experimental Psychology: Human Perception and Performance*.
67. Hsee, C. K, G. Loewenstein, S. Blount, M. Bazerman. (1999): "Preference Reversals Between Joint and Separate Evaluation of Options: A Review and Theoretical Analysis," *Psychological Bulletin*.
68. Ariely, D., G. Loewenstein, and D. Prelec (2003): "Coherent Arbitrariness: Stable Demand Curves Without Stable Preferences," *Quarterly Journal of Economics*.
69. Kamenica, E (2008): "Contextual Inference in Markets: On the Informational Content of Product Lines." *American Economic Review*.
70. Bordalo, P., N. Gennaioli, and A. Shleifer (2012): "Salience and Consumer Choice," Mimeo, Harvard.
71. Koszegi, Botond and Adam Szeidl. (2012): "A Model of Focusing in Economic Choice." *Quarterly Journal of Economics*.
72. Bushong, Ben, Matthew Rabin, and Josh Schwartzstein, "A Model of Relative Thinking," mimeo.
73. **Loewenstein, George, Ted O'Donoghue, and Matthew Rabin. (2003): "Projection Bias in Predicting Future Utility," *Quarterly Journal of Economics*, 118 (4): 1209-1248.**
74. Read, Daniel, and Barbara van Leeuwen. (1998): "Predicting Hunger: The Effects of Appetite and Delay on Choice." *Organizational Behavior and Human Decision Processes*, 76(2): 189-205.
75. Badger, Gary, Warren K. Bickel, Louis A. Giordano, Eric A. Jacobs, George F. Loewenstein, and Lisa Marsch. (2007): "Altered states: The impact of immediate craving on the valuation of current and future opioids." *Journal of Health Economics*, 26: 865-876.
76. Conlin, M., T. O'Donoghue, and T. Vogelsang. (2007): "Projection Bias in Catalog Orders," *American Economic Review*.
77. Busse, M., D. Pope, J. Pope, J. Silva-Risso. (2012): "Projection Bias in the Car and Housing Markets." NBER Working Paper.
78. **Frederick, S., Loewenstein, G. and O'Donoghue, T. (2002), "Time discounting and time preference: A critical review," *Journal of Economic Literature*, 40 (2): 351-401.**
79. Elster, Jon and George Loewenstein. (1992): *Choice Over Time*, New York: Russell Sage Foundation. [An excellent collection of writings on intertemporal choice from a variety of perspectives, based on a conference.]
80. Loewenstein, George, Read, Daniel, and Baumeister, Roy, eds. (2003) *Time and Decision: Economic and Psychological Perspectives on Intertemporal Choice*, Russell Sage Foundation. [Another excellent collection in the vein of the Elster and Loewenstein volume listed just above.]
81. **O'Donoghue, Ted and M. Rabin. (1999): "Doing it now or later." *American Economic Review*, 89(1), 103-124.**
82. **O'Donoghue, T. and M. Rabin. (2001): "Choice and Procrastination," *Quarterly Journal of Economics*, 116(1), 121-160.**
83. Akerlof, George. (1991): "Procrastination and Obedience," The Richard T. Ely Lecture, *American Economic Review, Papers and Proceedings*, 81(2): 1-19.
84. Augenblick, Ned, Muriel Niederle and Charles Sprenger. (2013): "Working Over Time: Dynamic Inconsistency in Real Effort Tasks," Working Paper, Stanford.
85. Augenblick, Ned, and Matthew Rabin. "Time Preference and Naivety in Real Effort Tasks." Working Paper, UC Berkeley.
86. Harris, Christopher and David Laibson. (2013): "Instantaneous Gratification," *Quarterly Journal of Economics*, 128(1): 205-248.

87. Laibson, David (1997): "Golden Eggs and Hyperbolic Discounting," *Quarterly Journal of Economics*, 112(2): 443–77, May.
88. Phelps, E.S. and R.A. Pollak. (1968): "On Second-Best National Saving and Game- Equilibrium Growth," *Review of Economic Studies*, 35(2): 185-199.
89. O'Donoghue, Ted and Matthew Rabin (2000): "The Economics of Immediate Gratification" (with Ted O'Donoghue), *Journal of Behavioral Decision Making* 13(2), 233-250.
90. O'Donoghue, Ted and Matthew Rabin (2006), "Optimal Sin Taxes." *Journal of Public Economics*, 90 (10-11): 1825-1849.
91. O'Donoghue, Ted and Matthew Rabin (1999): "Addiction and Self Control," in *Addiction: Entries and Exits*, Jon Elster, editor, Russel Sage Foundation.
92. Mischel, Walter, Yuichi Shoda, and Monica L. Rodriguez (1989): "Delay of Gratification in Children," *Science*, 244(4907): 933-938.
93. Read, Daniel, George Loewenstein, and Shobana Kalyanaraman. (1999): "Mixing Virtue and Vice: Combining the Immediacy Effect and the Diversification Heuristic." *Journal of Behavioral Decision Making*, 12(4): 257-273.
94. Schelling, Thomas C. (1992): "Self-Command: A New Discipline," *Choice Over Time*, George Loewenstein and Jon Elster eds., 167–176.
95. Angeletos, George-Marios, David Laibson, Andrea Repetto, Jeremy Tobacman, and Stephen Weinberg. (2001): "The Hyperbolic Buffer Stock Model: Calibration, Simulation, and Empirical Evaluation," *Journal of Economic Perspectives*, 15(3): 47-68.
96. DellaVigna, Stefano, and Ulrike Malmendier. (2004): "Contract Design and Self- Control: Theory and Evidence." *Quarterly Journal of Economics*, 119(2): 353-402.
97. DellaVigna, Stefano, and Ulrike Malmendier. (2006): "Paying Not to Go to the Gym." *American Economic Review*, 96(3): 694-719.
98. DellaVigna, S. and Paserman, M.D. (2005): "Job Search and Impatience," *Journal of Labor Economics*.
99. Fang, H. and D. Silverman (2009): "Time-Inconsistency and Welfare Program Participation: Evidence from the NLSY," *International Economic Review*.
100. Banerjee, A. and S. Mullainathan (2010): "The Shape of Temptation: Implications for the Economic Lives of the Poor".
101. Duflo, Esther, Michael Kremer, and Jonathan Robinson. (2010): "Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya." Working Paper.
102. Kaur, Supreet, Michael Kremer, and Sendhil Mullainathan (2010): "Self-Control and the Development of Work Arrangements," *American Economic Review*, 100(2): 624- 628.
103. Kaur, Supreet, Michael Kremer, and Sendhil Mullainathan. (2010): "Self-Control at Work: Evidence from a Field Experiment," Working Paper.
104. Laibson, David, Andrea Repetto, and Jeremy Tobacman. (2008): "Estimating Discount Functions with Consumption Choices over the Lifecycle." NBER Working Paper.
105. Benartzi, Shlomo and Richard H. Thaler. (2004): "Save More Tomorrow: Using Behavioral Economics to Increase Employee Savings," *Journal of Political Economy*, 112(1): 164-187.
106. Gul, F. and W. Pesendorfer (2001): "Temptation and Self-Control," *Econometrica*.
107. Fudenberg, D. and D. Levine (2006): "A Dual-Self Model of Impulse Control," *American Economic Review*.
108. Loewenstein, G. and T. O'Donoghue (2005). "Animal Spirits: Affective and Deliberative Processes in Economic Behavior," Mimeo, Cornell.
109. Carroll, Gabriel D., James Choi, David Laibson, Brigitte C. Madrian, and Andrew Metrick. (2009): "Optimal Defaults and Active Decisions." *Quarterly Journal of Economics* 124(4): 1639-1674.

110. Ariely, Dan and Klaus Wertenbroch. (2002): "Procrastination, Deadlines, and Performance: Self-Control by Precommitment," *Psychological Science*, 13(3): 219- 224.
111. Chabris, Christopher F., David Laibson, Carrie L. Morris, Jonathon P. Schuldt, Dmitry Taubinsky. (2008): "Individual Laboratory-Measured Discount Rates Predict Field Behavior," *Journal of Risk and Uncertainty*, 37(2-3): 237-269.
112. Choi, James, David Laibson, Brigitte C. Madrian, and Andrew Metrick. (2002): "Defined Contribution Pensions: Plan Rules, Participant Decisions, and the Path of Least Resistance," *Tax Policy and the Economy*, 16: 67-113.
113. Laibson David, Andrea Repetto and Jeremy Tobacman. (1998): "Self-Control and Saving for Retirement," *Brookings Papers on Economic Activity* 1: 91-196.
114. Choi, James, David Laibson and Brigitte C. Madrian. (2011): "\$100 Bills on the Sidewalk: Suboptimal Investment in 401(k) Plans," *Review of Economics and Statistics*, 93(3): 748-763.
115. Agarwal, Sumit, John Driscoll, Xavier Gabaix, and David Laibson. (2009): "The Age of Reason: Financial Decisions over the Life-Cycle and Implications for Regulation," *Brookings Papers on Economic Activity*, 2, 51-117.
116. Madrian, Brigitte and Dennis F. Shea. (2001): "The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior" *Quarterly Journal of Economics*, 116(4): 1149-1187.
117. Milkman, Katherine L., John Beshears, James J. Choi, David Laibson, Brigitte C. Madrian. (2011): "Using Implementation Intentions Prompts to Enhance Influenza Vaccination Rates," *Proceedings of the National Academy of Sciences*, 108(26): 10415-10420.
118. O'Donoghue, Ted and Matthew Rabin. (1999): "Incentives for Procrastinators," *Quarterly Journal of Economics*, 114(3): 769-816.
119. O'Donoghue, Ted and Matthew Rabin (1999): "Procrastination in Preparing for Retirement," in *Behavioral Dimensions of Retirement Economics*, Henry Aaron, editor, The Brookings Institution.
- 120. Kahneman, Daniel and Amos Tversky. "Introduction." In *Judgment Under Uncertainty: Heuristics and Biases*, Ch. 1, 3–22.**
121. Kahneman, Daniel, and Amos Tversky. (1974): "Judgment under Uncertainty: Heuristics and Biases," *Science*, 185: 1124-1131.
122. Kahneman, D, and A. Tversky. (1983): "Extensional vs. Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment," *Psychological Review*, 90(4): 293- 315.
123. Tversky, Amos, and Derek Koehler, (1994): "Support Theory: A Nonextensional Representation of Subjective Probability," *Psychological Review*, 101(4): 547-567.
124. Kahneman, D., and Tversky, A. (1972): "Subjective probability: a judgment of representativeness," *Cognitive Psychology*, 3(3): 430-454.
125. Slovic, P., Griffin, D., and Tversky, A. "Compatibility effects in judgment and choice," In Griffin, D., and Kahneman, D., Eds. *Heuristics and biases: the psychology of intuitive judgment*.
126. Tversky, A., & Kahneman, D. (1973): "Availability: a heuristic for judging frequency and probability," *Cognitive Psychology*, 5(2): 207-232.
127. Fox, C., & Tversky, A. (1995): "Ambiguity aversion and comparative ignorance," *Quarterly Journal of Economics*, 110(3): 585-603.
128. Gilovich, T. (1983): "Biased evaluation and persistence in gambling," *Journal of Personality and Social Psychology*, 44(6): 1110-1126.
129. Benjamin, Dan, Don Moore, and Matthew Rabin. (2013): "Misconceptions of Chance: Evidence from an Integrated Experiment." Working Paper, UC Berkeley.
- 130. Griffin, D. and A. Tversky. (1992): "The Weighing of Evidence and the Determinants of Confidence," *Cognitive Psychology*, 24: 411-435.**
- 131. Rabin, Matthew. (2002): "Inference by Believers in the Law of Small Numbers." *Quarterly Journal of Economics*, 117(3): 775-816.**

132. Rabin, Matthew and Dimitri Vayanos. (2010): "The Gambler's and Hot-Hand Fallacies: Theory and Applications." *Review of Economic Studies*, 77(2): 730-778.
133. Benjamin, D., M. Rabin, and C. Raymond. (2013): "A Model of Non-Belief in the Law of Large Numbers," Working Paper, UC Berkeley.
134. Benjamin, Dan, Aaron Bodoh-Creed, and Matthew Rabin. (2013): "The Dynamics of Base-Rate Neglect," Working Paper, UC Berkeley.
135. Rabin, Matthew and Joel Schrag. (1999): "First Impressions Matter: A Model of Confirmatory Bias." *Quarterly Journal of Economics*, 114(1): 37-82.
136. Madarasz, Kristof. (2012): "Information Projection: Model and Applications," *Review of Economic Studies*, 79 (3): 961-985.
137. Tversky, A., & Koehler, D.J. (1994). Support theory: A nonextensional representation of subjective probability. *Psychological Review*, 101, 547-567.
138. **Eyster, Erik, and Matthew Rabin. (2005): "Cursed Equilibrium." *Econometrica*, 73(5): 1623-1672.**
139. Eyster, Erik, Matthew Rabin, and Dimitri Vayanos. (2013): "Financial Markets Where Traders Neglect the Informational Content of Prices." Working Paper.
140. Jehiel, P. (2005): "Analogy-Based Expectation Equilibrium," *Journal of Economic Theory*.
141. Mullainathan, S., J. Schwartzstein, and A. Shleifer (2008): "Coarse Thinking and Persuasion," *Quarterly Journal of Economics*.
142. Esponda, I. (2008): "Behavioral Equilibrium in Economies with Adverse Selection," *American Economic Review*.
143. Esponda, Ignacio and Demian Pouzo, "An Equilibrium Framework for Players with Misspecified Models", working paper, Berkeley.
144. **DeMarzo, Peter, Dimitri Vayanos, and Jeff Zwiebel (2003), "Persuasion bias, social influence, and unidimensional opinions," *Quarterly Journal of Economics*.**
145. **Eyster, Erik, and Matthew Rabin. (2010): "Naïve Herding in Rich-Information Settings." *American Economic Journal: Microeconomics*, 2: 221-243.**
146. Eyster, E. and M. Rabin. (2008): "Rational and Naïve Herding," Working Paper, UC Berkeley.
147. **Eyster, E. and M. Rabin. (2014): "Extensive Imitation is Irrational and Harmful," forthcoming, *Quarterly Journal of Economics*.**
148. Gagnon-Bartsch, Tristan and Matthew Rabin (2014), "Naïve Social Learning, Mislearning, and Unlearning", preliminary draft.
149. Gagnon-Bartsch, T. (2014): "Taste Projection in a Model of Social Learning," Working Paper, UC Berkeley.
150. Shleifer, Andrei. (2000): "Inefficient Markets," Clarendon Lectures, Oxford University Press. [Based on a series of lectures, very nice sort of introduction to behavioral finance.]
151. Gabaix, Xavier and David Laibson (2006), "Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets," *Quarterly Journal of Economics*, 121(2): 505-540.
152. Koszegi, Botond, Paul Heidhues, and Takeshi Murooka "The Market for Deceptive Products" working paper 2012.
153. Brown, Jennifer, Tanjim Hossain, and John Morgan (2010). "Shrouded Attributes and Information Suppression: Evidence from the Field" *Quarterly Journal of Economics* 125(2): 859-876.
154. Laibson, David and Leeat Yariv (2007), "Safety in Markets: An Impossibility Theorem for Dutch Books," working paper.
155. Delong, B., L. Summers, A. Shleifer, and R. Waldmann (1990): "Noise Trader Risk in Financial Markets," *Journal of Political Economy*.
156. Shleifer, A. and R. Vishny (1997): "The Limits of Arbitrage," *Journal of Finance*.